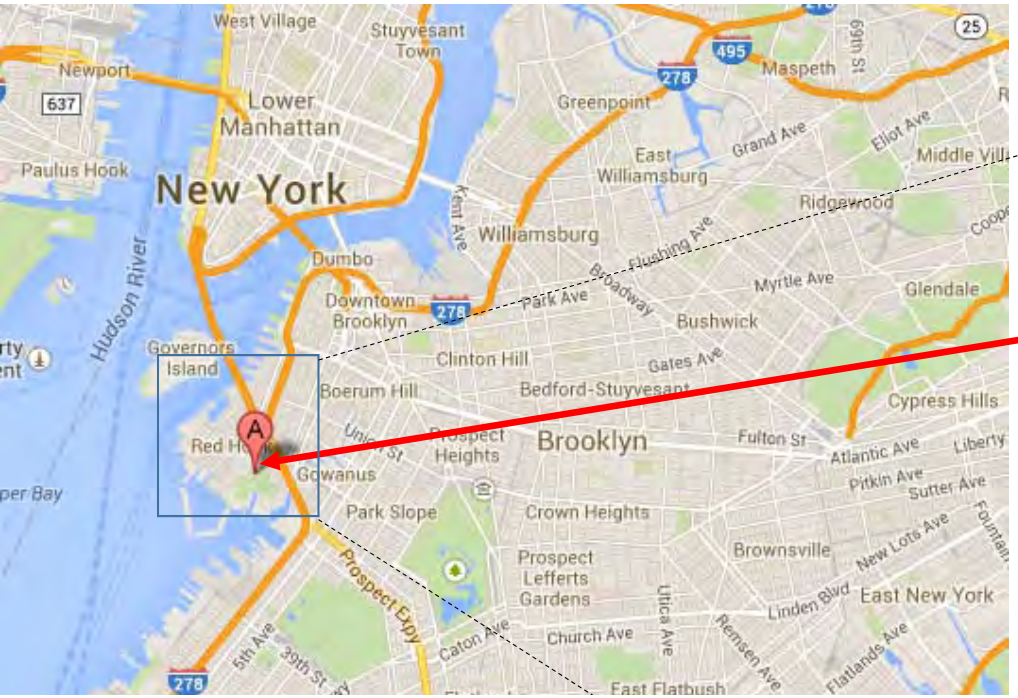
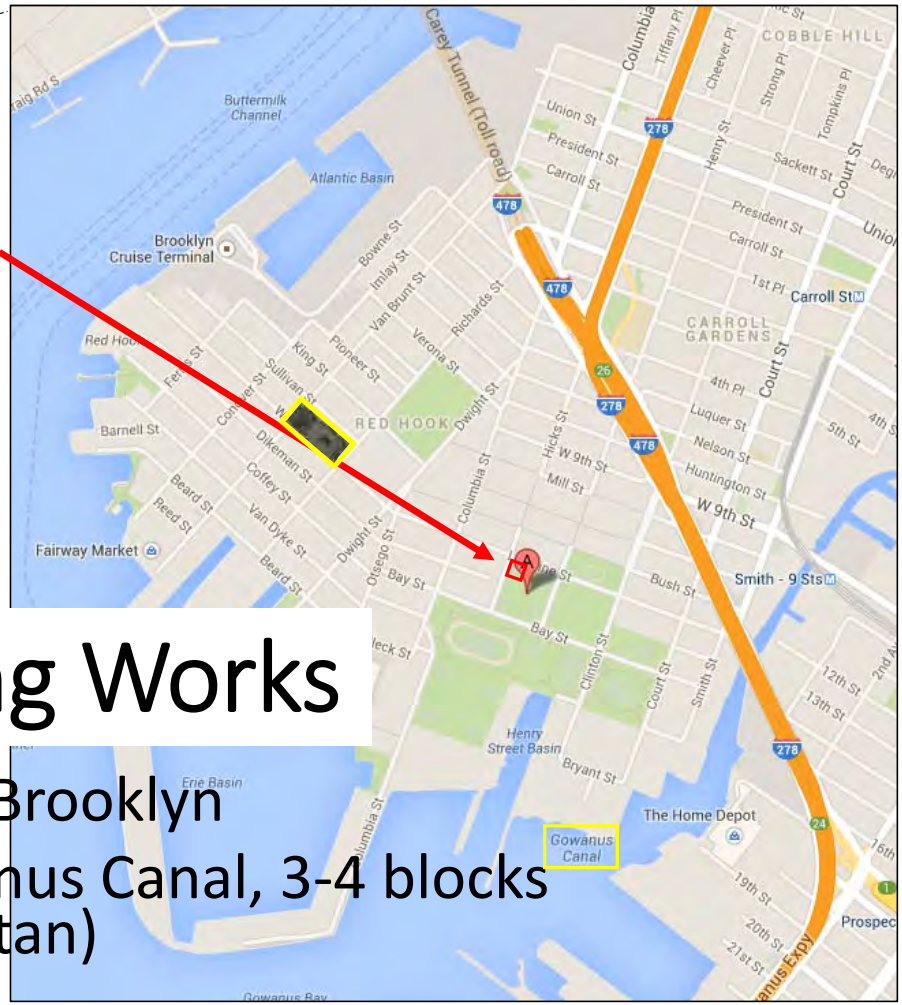
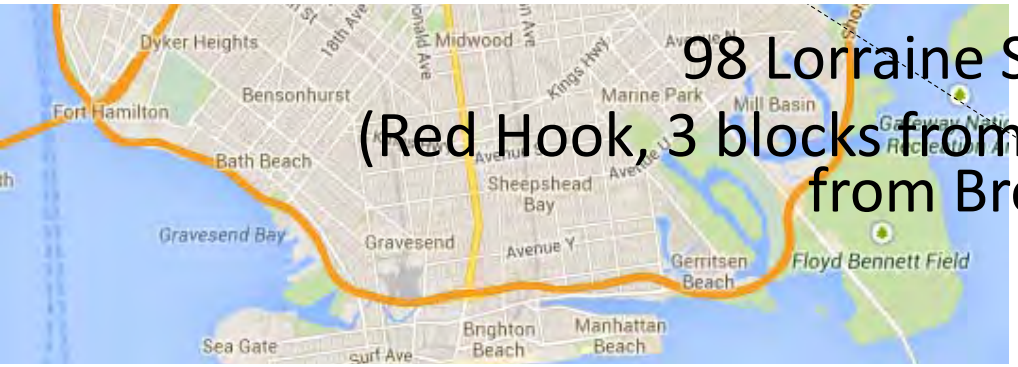


Site



Columbia Smelting & Refining Works



98 Lorraine Street, Brooklyn

(Red Hook, 3 blocks from Gowanus Canal, 3-4 blocks from Brookhattan)

387112

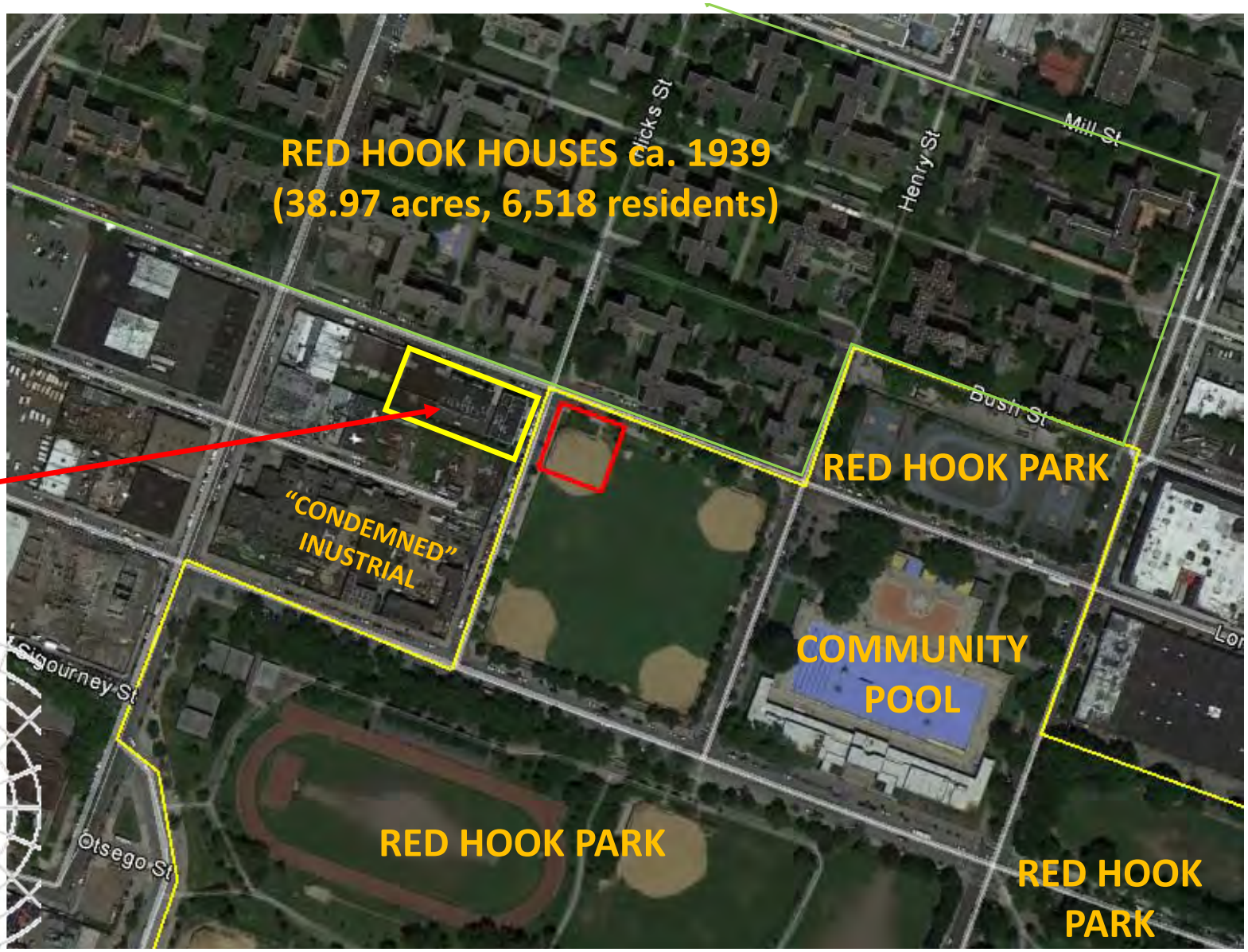
Overview

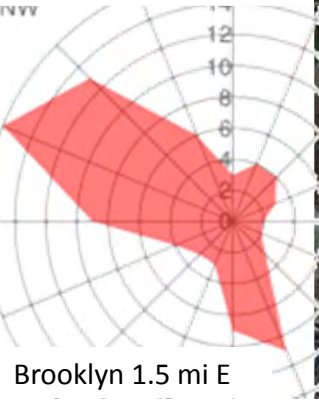
- Site background refresher (history + 2012 remediation)
- Summary of October 2014 sampling approach + results
- Presentation of cleanup levels
- Attribution to Site
- Removal Eligibility
- Next steps

SITE

- 4.17 ac
- Owned by DPR
- Park is 58 acres

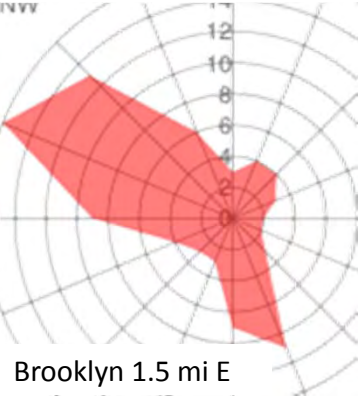
RESIDENCES (ca. 2008) + DAYCARE





Brooklyn 1.5 mi E

RED HOOK PARK Fields

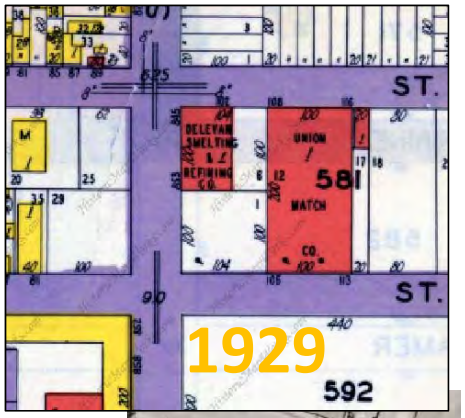


Brooklyn 1.5 mi E

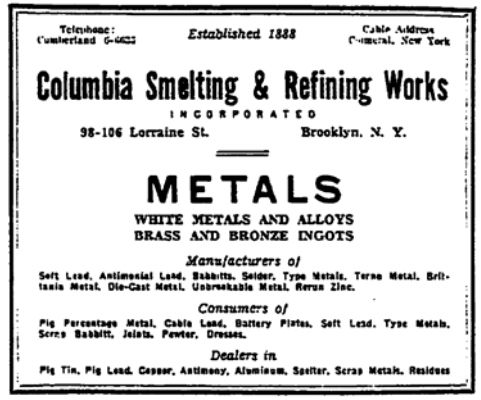
SITE HISTORY

Late '20s – late '30s: Smelting on-site

- ***1922***: Delevan Smelting & Refining Works was incorporated, Site still undeveloped 1924
- ***1929***: Delevan Smelting & Refining Works on-site
- ***1931-late 1930s***: Columbia Smelting & Refining Works
- 14,000 sf building with 8 furnaces
- ***1939-1940***: Building demolished, block is vacant



1931


Telephone: Cumberland 6-6633 — Established 1888 — Cable Address: Comeral, New York

Columbia Smelting & Refining Works

INCORPORATED

98-106 Lorraine St. — Brooklyn, N. Y.

METALS

WHITE METALS AND ALLOYS
BRASS AND BRONZE INGOTS

Manufacturers of

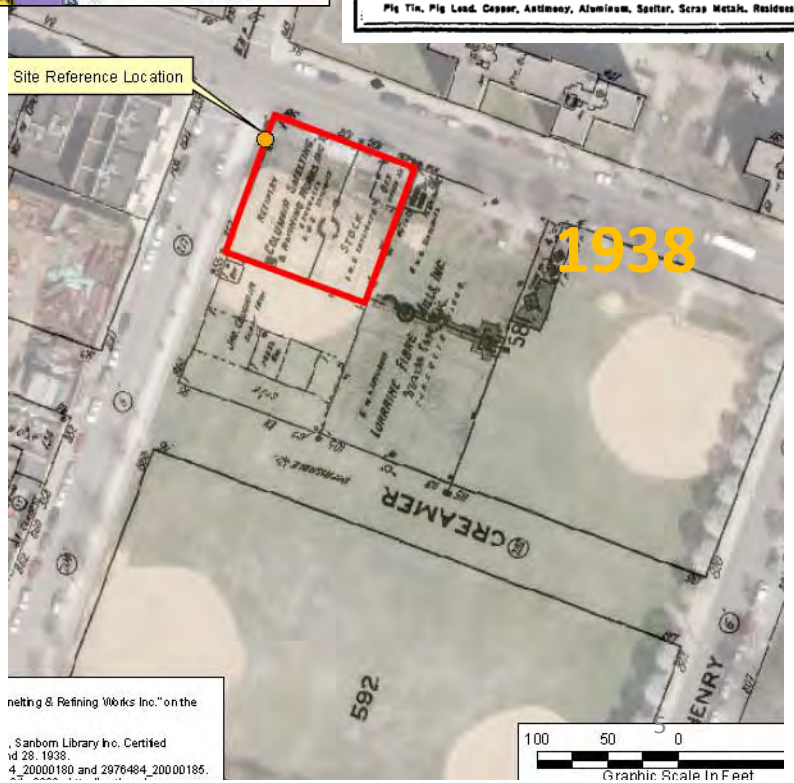
Soft Lead, Antimonial Lead, Babbitts, Solder, Type Metals, Terne Metal, Britannia Metal, Die-Cast Metal, Unbreakable Metal, Rerun Zinc.

Consumers of

Pig Percentage Metal, Cable Lead, Battery Plates, Soft Lead, Type Metals, Scrap Babbitt, Joists, Pewter, Dresses.

Dealers in

Pig Tin, Pig Lead, Copper, Antimony, Aluminum, Spelter, Scrap Metals, Residues

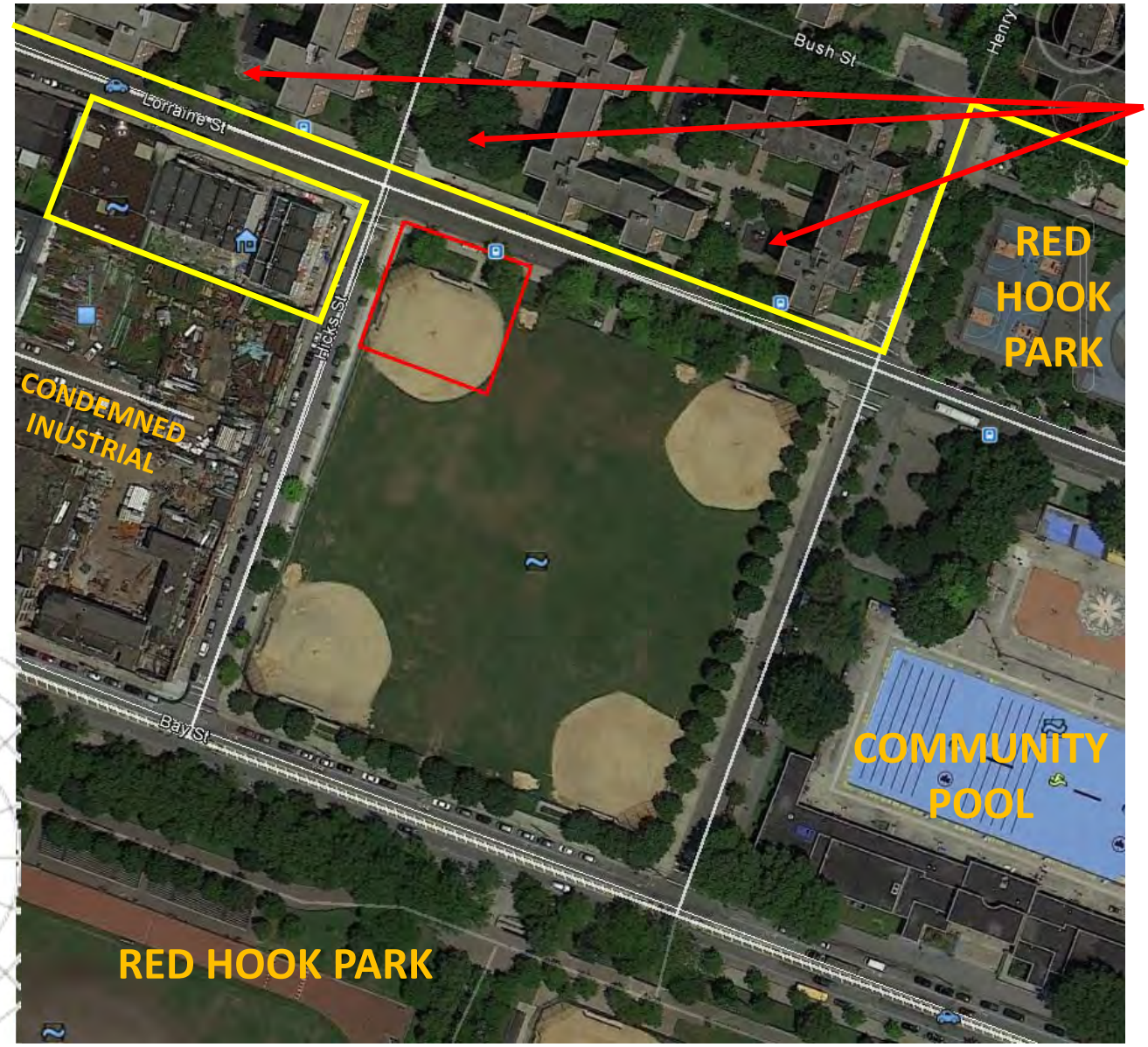


Columbia Smelting & Refining

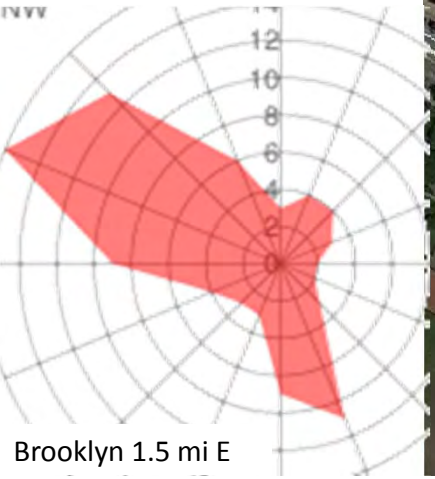
- ***Manufactured:*** soft lead, antimonial lead, Babbitts, solder, type metals, terse metal, Britannia metal, die-cast metal, unbreakable metal and rerun zinc
- ***Consumed:*** pig percentage metal, cable lead, battery plates, soft lead, type metals, Babbitt, joists, pewter and dresses
- ***Dealt in:*** pig tin, pig lead, copper, antimony, aluminum, spelter, scrap metals and residues

1940 onward – undeveloped & baseball diamond

BARE SOIL



PLAYGROUNDS



Brooklyn 1.5 mi E

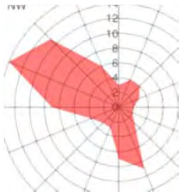
Site block from southeast.

Site where former smelter building was located.

Looking north from the Site's baseball diamond.

On-site soil outside the baseball field.

Bare soil in Red Hook Park to south (downwind) of Site.



Residences & soil across street from Site.

Playground in
Red Hook Houses

2012 INVESTIGATION

USA Today 2012 Sampling (XRF + lab)

- "6 of 8 samples collected from ball fields had elevated lead levels"
  - 4 of the 6 had >2,000 ppm lead
  - Data posted online shows 9 of 19 results >400 ppm
  - All 4 lab results exceed 400ppm

Soil Test Results:

Fields in Red Hook Park

Total Tests: 19
Highest Result: 2236

	Sample Result (ppm)*	Type of test
Property 1	240	XRF
	323	XRF
	483	XRF
	728	Lab
	1314	XRF
	2116	XRF
	58	XRF
	237	XRF
	2027	XRF
	1666	Lab
	2236	Lab
	2067	Lab
	123	XRF
	271	XRF
	263	XRF
	188	XRF
	95	XRF
	48	XRF
	144	XRF

2012 INVESTIGATION

USA Today 2012 Sampling (XRF + lab)

- Red Hook Houses: 6 of 16 results exceeded 400 ppm
  - 3 lab results + 3 XRF readings

Soil Test Results:

Red Hook Houses courtyards and open spaces

Total Tests: 16
Highest Result: 953

	Sample Result (ppm)*	Type of test
Property 1	87	XRF
	719	XRF
	390	XRF
	647	**Lab**
	59	XRF
	145	XRF
	50	XRF
	839	XRF
	450	XRF
	953	**Lab**
	476	**Lab**
	391	XRF
	80	XRF
	181	XRF
	257	XRF
	255	Lab

2012 INVESTIGATION

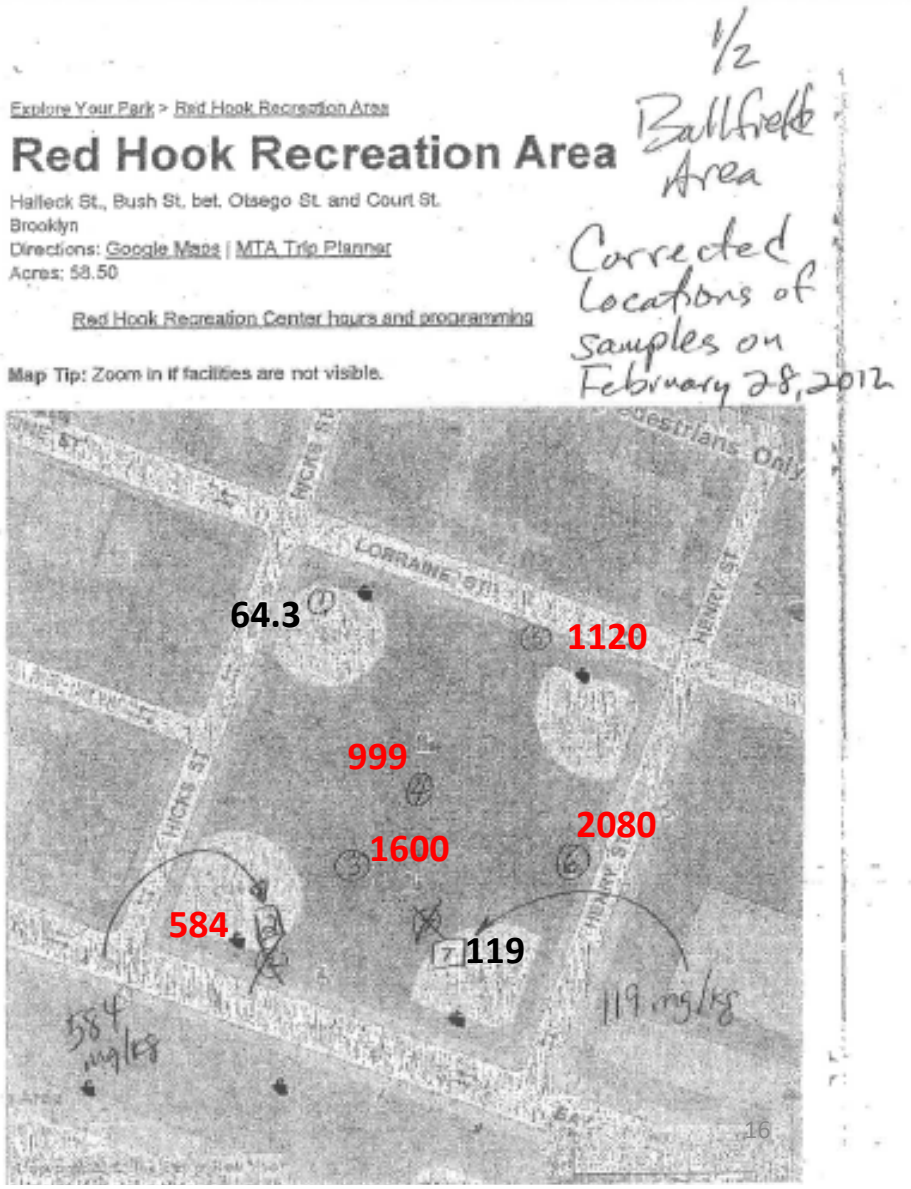
Department of Parks & Recreation

- To confirm USA Today sampling
- **February 28:** 9 samples collected
  - Surface – upper 6" of soil
  - 6 of 9 exceeded 400 ppm for lead

Sample #	Location	Description	Laboratory Results Pb (Dry)(mg /kg)	RL Dry (mg/kg)
F7-1	Ball Field # 7/Northwest Corner of Ball Field (Lorraine & Hicks Street)	Surface Soil	64.3	10.5
F6-2	Ball Field # 6 / Northwest Corner of Ball Field (Hicks & Bay Street)	Surface Soil	584	10.4
F5-3	Ball Field # 5 / Middle of Ball Field # 5	Surface Soil	1600	13.0
FC-4	Center of Four Ball Fields	Surface Soil	999	16.5
F8-5	Outside of Ball Field # 8 / North Middle of Ball Field/By Lorraine Street/Between Sidewalk & Fences	Surface Soil	1120	11.9
F58-6	Ball Field # 5 & # 8/East Middle of Ball Field # 5 & # 8	Surface Soil	2080	11.2
F5-7	Ball Field # 5 Henry Street Side/South East of Ball Field (Henry & Bay Street)	Surface Soil	119	11.4
F5-8	Red Hook Synthetic Field by Court & Bay Streets/Outside Synthetic Field North End Middle	Surface Soil	447	11.3
F5-9	Red Hook Synthetic Field by Court & Bay Streets/Bay Street Sidewalk & Walk Path/Middle	Surface Soil	177	12.0

Analysis by : Flame AAS
Method of Analysis : EPA 7000B, EPA/SW 846-3050B
MDL : 2.74 mg/kg
RL: 10 mg/kg

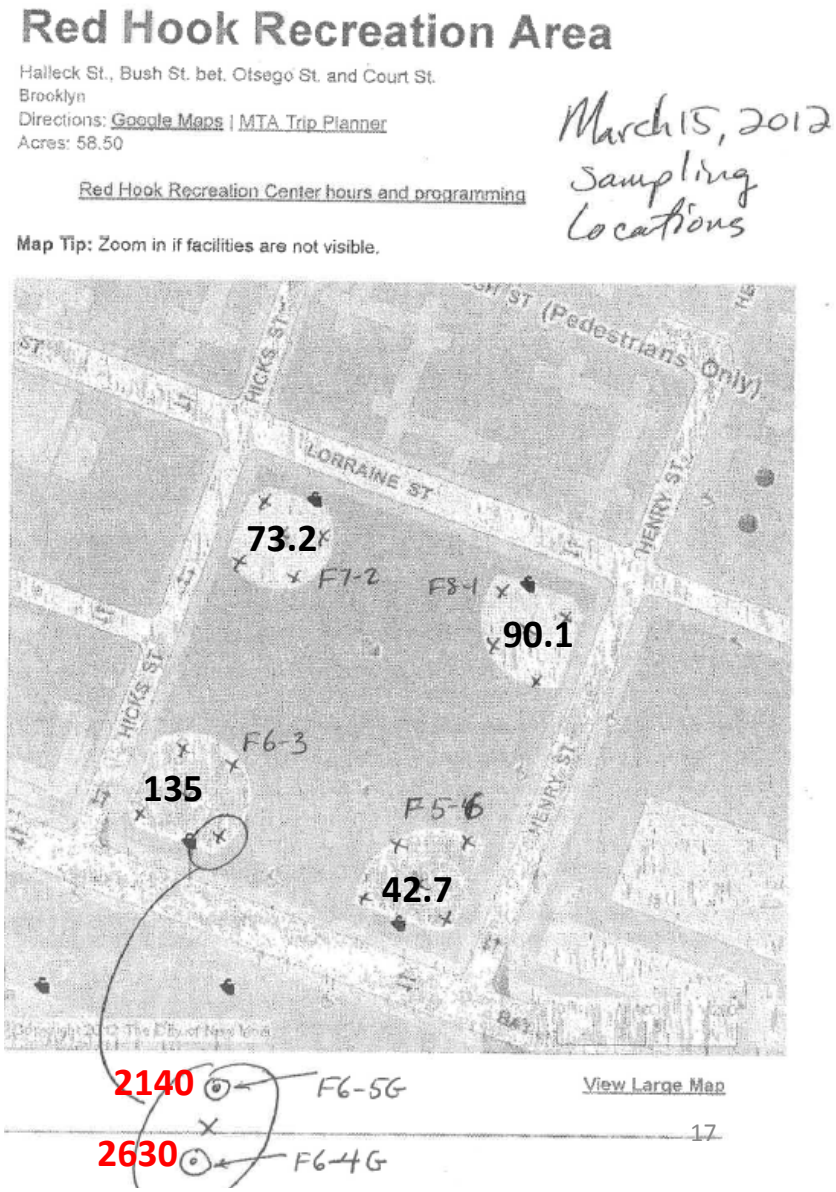
Date Received : 02/28/12
Date of Analysis : 02/29/12
Date of Report: 03/02/12



2012 INVESTIGATION

Department of Parks & Recreation

- **February/March:** DPR added 1” infield material added to each infield
- **March 15:** 6 confirmatory samples collected
  - 4 from newly-placed infield material
    - Low lead levels
  - 2 at 2” bgs (to confirm result of 584 ppm)
    - Both >2,000 ppm lead



2012 REMEDIATION

Department of Parks & Recreation (with NYC DOHMH)

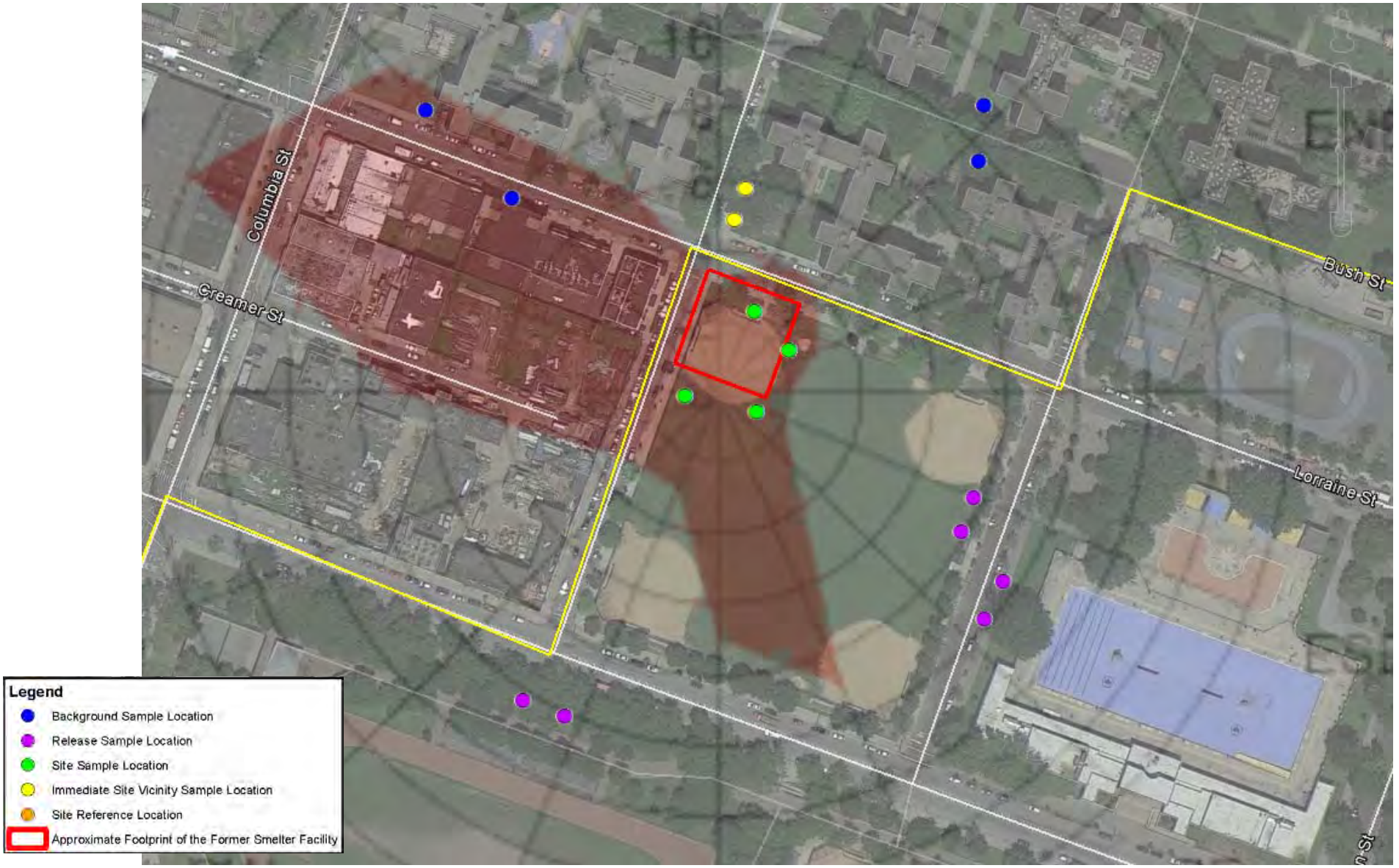
- **March:** 4,500 lbs soil excavated, 50 sf area with high lead level excavated & paved over.

- **March 20:** 1 surface soil sample for disposal purposes
  - 812 ppm lead, 1.96 ppm cadmium
  - Not analyzed for antimony, tin, zinc
  - No VOCs; some SVOCs under RML

- **March 23:** Park closed for 4-6 weeks for hydroseeding (plug aeration) and grass growth
  - Wood chips added to bare soil areas
  - No post-remediation sampling

CURRENT EPA INVESTIGATION

- Pre-remedial; October 15-16
  - Results – November 26
- 16 locations
- Maximium 2’ depth; 5 intervals
  - 0-1”
  - 1-6”
  - 6-12”
  - 12-18”
  - 18-24”
- *Total:* **82** samples
- TAL metals + tin


Columbia St
Creamer St
Bush St
Lorraine St
Legend
Background Sample Location
Release Sample Location
Site Sample Location
Immediate Site Vicinity Sample Location
Site Reference Location
Approximate Footprint of the Former Smelter Facility

CLEANUP NUMBERS

- Superfund Lead-Contaminated Residential Sites Handbook (Aug. 2003):

1.3 DEFINITION AND PURPOSE

Residential properties are defined in the Handbook as any area with high accessibility to sensitive populations, and includes properties containing single- and multi-family dwellings, apartment complexes, vacant lots in residential areas, schools, day-care centers, community centers, playgrounds, parks, green ways, and any other areas where children may be exposed to site-related contaminated media (EPA, 1996a, 1997a, 1998a). This document defines sensitive populations as young children (those under

- Risk Assessor (0-6 year old, 72 days/year for 2 hours/day):

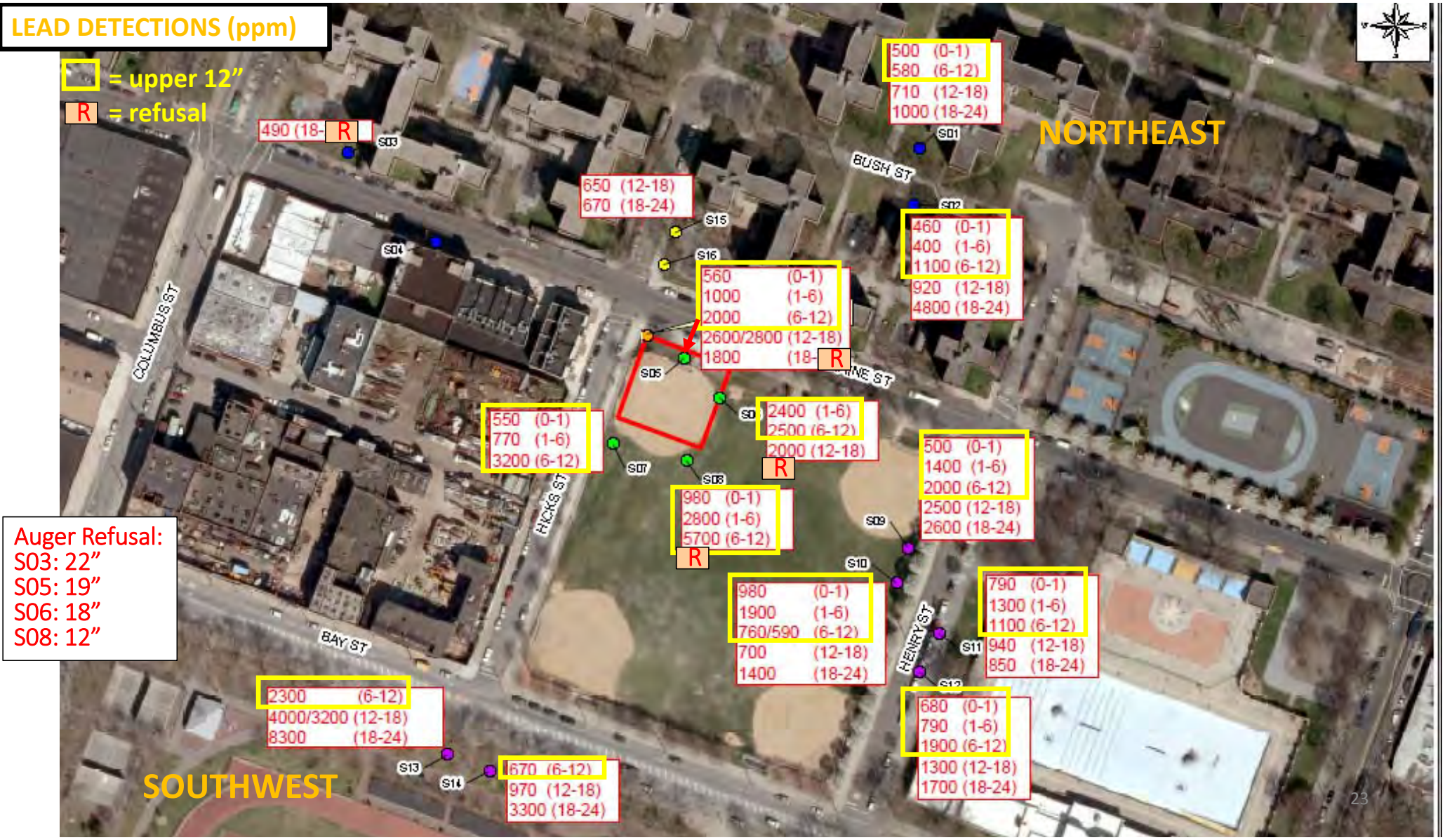
Chemical	Risk-based PRG: Ball Player (10-6 Cancer Risk; HI 1) mg/kg	Risk-based PRG: Residential (10-6 Cancer Risk; HI 1) mg/kg	NYS SCO Unrestricted mg/kg	NYS SCO Residential and Restricted-Residential mg/kg
Antimony (metallic)	150 nc	30 nc	na	na
Arsenic, Inorganic	2.4 c*	0.67 c*	13	16
Iron	260000 nc	55000 nc	na	na
Lead and Compounds	400 nc	400 nc	63	400

RESULTS

- Residential RML Exceedences (out of 82 samples):
  - Lead: 55
  - Antimony: 9
  - Arsenic: 9
  - Iron: 7

- Lead
  - *Surface lead*: >400 ppm in half the locations; max 980 ppm
    - Not expected to be immediate concern
  - *Depth*: lead prevalent in 1,000-2,000 range
  - *Max*: 8,300 ppm

- Most elevated detections found at 6-12”; many others at 12-24”

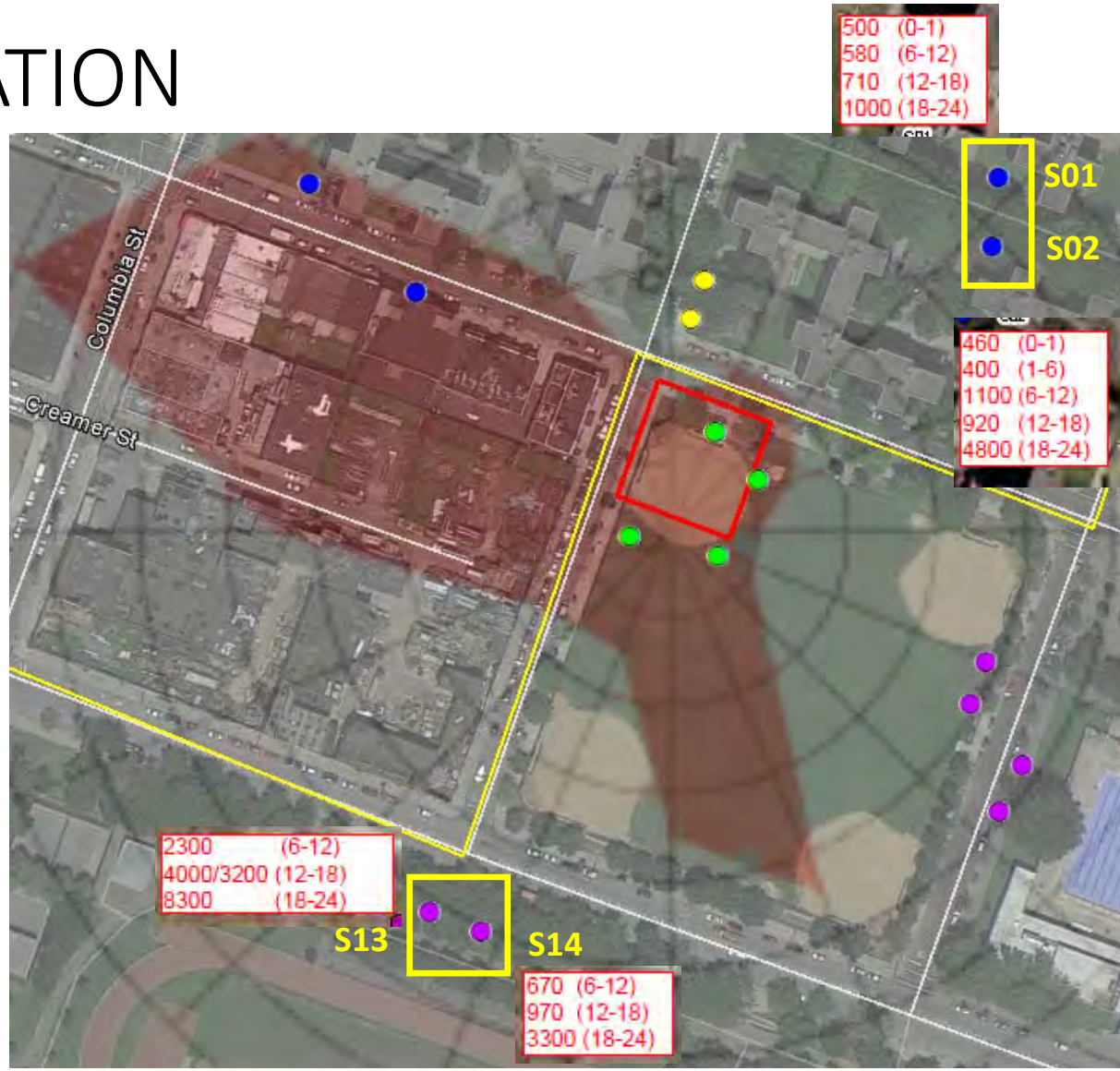

LEAD DETECTIONS (ppm)
= upper 12”
R = refusal
Auger Refusal:
S03: 22”
S05: 19”
S06: 18”
S08: 12”
NORTHEAST
SOUTHWEST
BUSH ST
BAY ST
COLUMBUS ST
HICKS ST
HENRY ST
490 (18- R
S03
650 (12-18)
670 (18-24)
S15
S16
S04
560 (0-1)
1000 (1-6)
2000 (6-12)
2600/2800 (12-18)
1800 (18- R
S05
500 (0-1)
580 (6-12)
710 (12-18)
1000 (18-24)
S01
460 (0-1)
400 (1-6)
1100 (6-12)
920 (12-18)
4800 (18-24)
550 (0-1)
770 (1-6)
3200 (6-12)
S07
S06
2400 (1-6)
2500 (6-12)
2000 (12-18)
R
S08
980 (0-1)
2800 (1-6)
5700 (6-12)
R
500 (0-1)
1400 (1-6)
2000 (6-12)
2500 (12-18)
2600 (18-24)
S09
S10
980 (0-1)
1900 (1-6)
760/590 (6-12)
700 (12-18)
1400 (18-24)
790 (0-1)
1300 (1-6)
1100 (6-12)
940 (12-18)
850 (18-24)
S11
2300 (6-12)
4000/3200 (12-18)
8300 (18-24)
S13
S14
670 (6-12)
970 (12-18)
3300 (18-24)
680 (0-1)
790 (1-6)
1900 (6-12)
1300 (12-18)
1700 (18-24)

ELEMENTAL CORRELATION

- Strong lead-tin and lead-antimony relationships for “On-Site” and “Downwind” samples; correlates with wind rose (see Excel file). Correlation indicates that contaminants are attributable to historic on-site smelting facility.

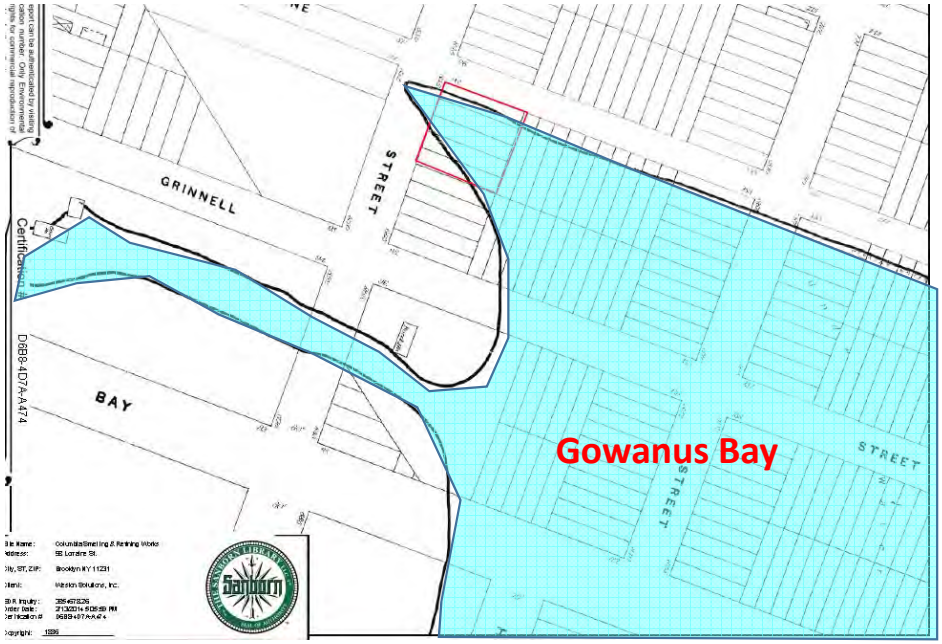
ELEMENTAL CORRELATION

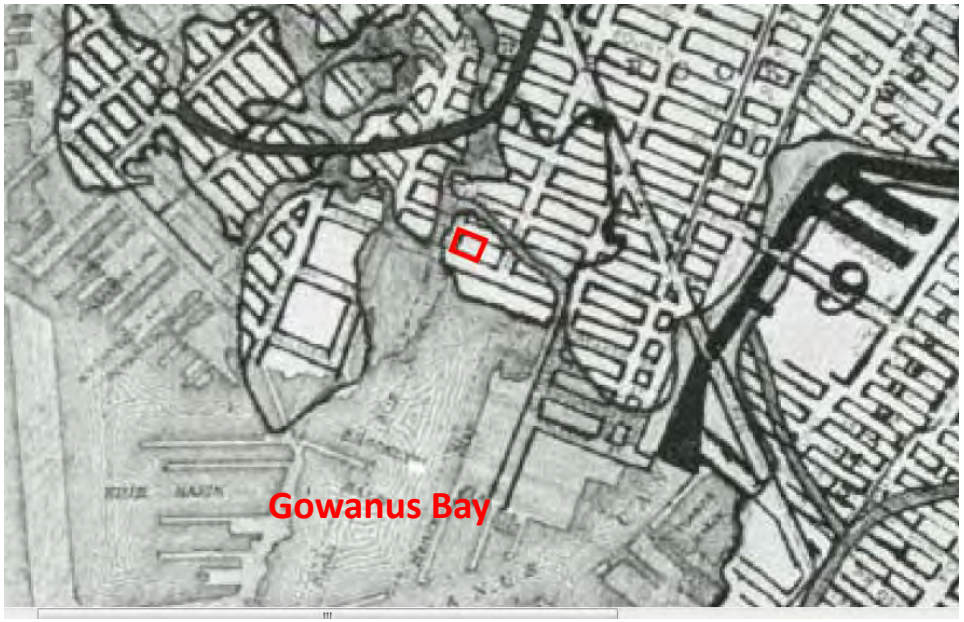
- S01, S02, S13, S14 did not exhibit strong lead-tin and lead-antimony relationships. Elevated lead levels do not appear to be attributable to Site; historic fill is suspected.



ELEMENTAL CORRELATION

- Historic fill – Shoreline, 1886 and ca. 1900





REMOVAL ELIGIBILITY

- Elevated lead levels in 8 locations on-site & downwind
  - **0-1”:** **500-980 ppm,** all locations except one (S02)
    - Also, NYC DPR data showed 999 and 1,600 ppm; remediated via hydroseed only
  - **1-6”:** **400-2,000 ppm,** all locations
  - **6-12”:** **790-5,700 ppm,** all locations

- Grass cover sparse in some locations; heavily used fields
- Bare soil in bleacher area
- Fields found to be unacceptable due to lack of maintenance in 2000, 2002, 2003, 2005
- Typical seeding protocol includes plug aeration, pulling contaminants to surface

- Popular food trucks present in park throughout warmer months
- High potential for sensitive populations to have direct contact with soil

REMOVAL ELIGIBILITY

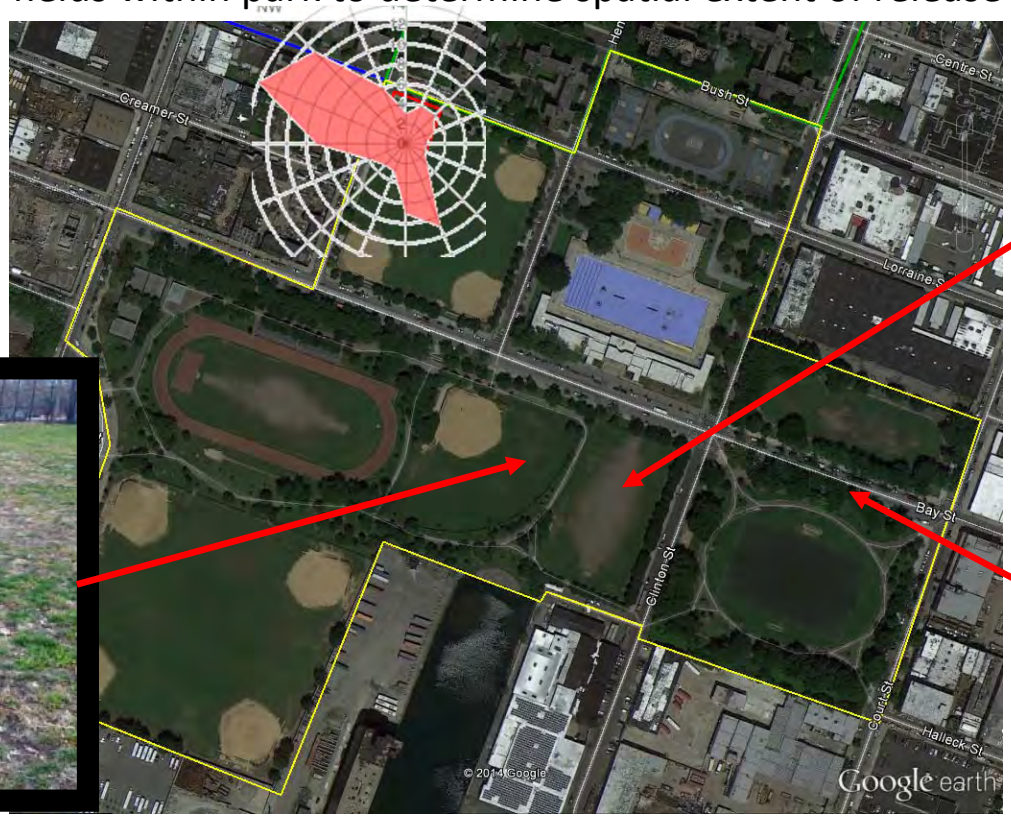
- **Conclusion**
  - Results & correlation analysis indicate release of CERCLA-designated hazardous substances has occurred from historic on-site facility. Elevated lead, arsenic, antimony and iron levels in on-site & downwind represent imminent and substantial threat to human health or welfare.

- Extent of contamination must be further defined/delineated.


Bleachers
Bus Stop
Bare Soil
Historic Facility Outline

ROUND 2 SAMPLING – January 2015

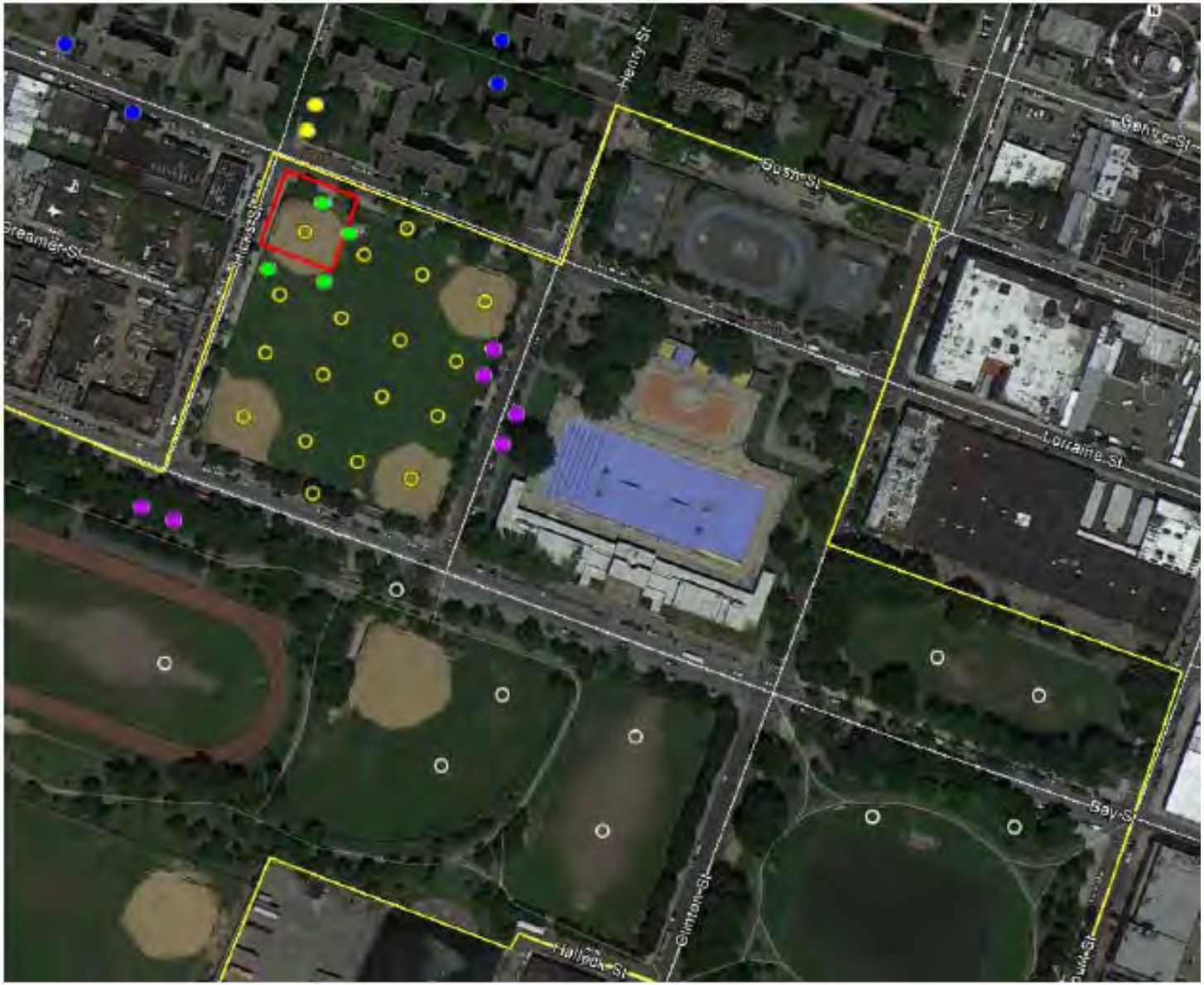
- **Objectives**
  - Delineate area(s) with known Site-related contamination, for removal purposes
  - Screen other fields within park to determine spatial extent of release



ROUND 2 SAMPLING – January 2015

- **Approach**
  - Handbook: Delineate on-site release with one composite sample per ¼-acre
    - Grid pattern for adequate coverage; additional samples in high-risk bleacher areas with bare soil
  - Screen other fields with discrete sampling – 2 locations per field
  - Intervals: 0-1”, 1-6”, 6-12”, 12-18”, 18-24”
  - GeoProbe to save time/personnel and increase consistency (depending on cost comparison)
- Data provided to NYC Parks Dept., City Law and NYC Health on Thursday 12/18/14, noting we’d like to complete additional sampling ASAP, with the potential need for a cleanup and the upcoming baseball season in mind
- See Google Earth for sampling plan

EPA Proposed Sampling Locations:
Red Hook Park/
Columbia Smelting & Refining Works Site



LEGEND

January 2015 Sampling Locations

- Composite Sample Location
- Discrete Sample Location

October 2014 Sampling Locations

- Background Sample Location
- Release Sample Location
- Site Sample Location
- Immediate Site Vicinity Sample Location
- Site Reference Location

- Approximate Footprint of the Former Smelter Facility
- Red Hook Park Border

NEXT STEPS

- Complete delineation of contamination that is attributable to Site
- Excavation to 12” as recommended by risk assessor & handbook
  - Visual barrier to demarcate contamination at 12” bgs
  - Deed Restriction recommended; need assurance that park will not be developed to include activity requiring unrestricted use (daycare, playground, residential, etc.)
    - NYC responsible for this
  - 6” excavation may be acceptable if Deed Restriction is placed on property
- Note: Site likely ineligible for NPL without Site-attributable contamination in NYCHA housing complex

CONSIDERATIONS

- Schedule:
  - **January thru late winter:** Discussions with NYC (access/permitting), Sampling
  - **Spring:** Additional delineation in fields, analysis of data, begin removal

  - **Early April:** Little league pre-season practice
  - **Late April:** Baseball season starts
  - **June**: Pool opens

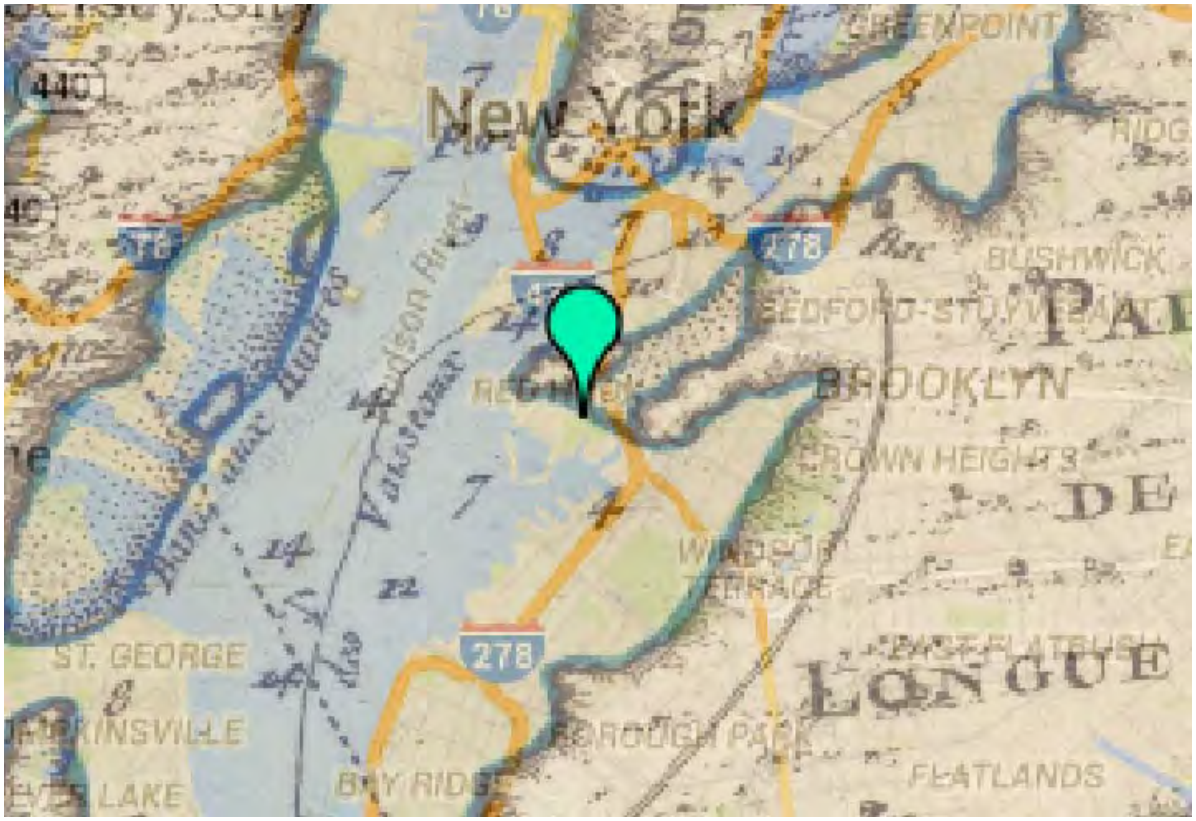
- NYC Parks & Rec (property owner) may be PRP
  - ORC support needed (Praschak?)
- EJ Area
  - CIC needed (Loney?)

APPENDIX A

Gowanus Canal Area Historic Shoreline References

(snips from images found online)

1764


New York
BROOKLYN
ST. GEORGE
LONGUE
278
278
278
BUSHWICK
FLATLANDS

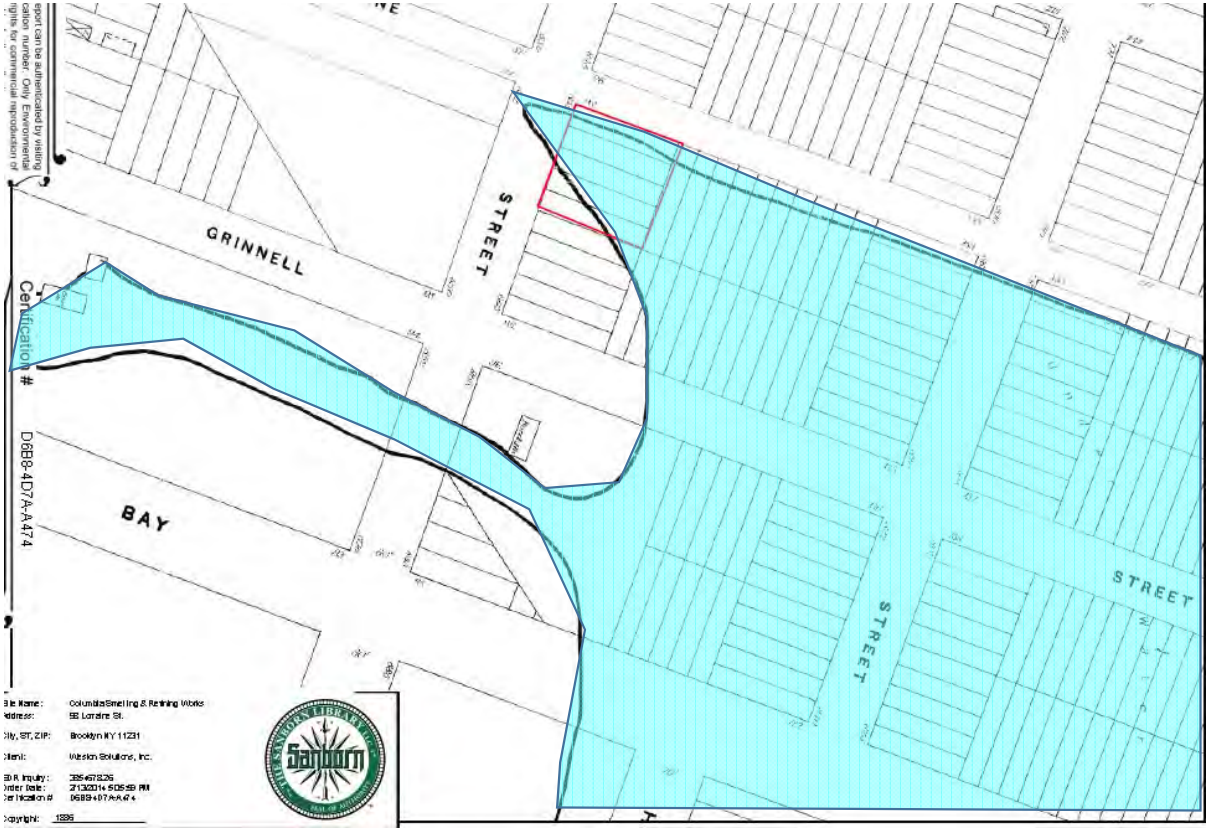
1766 (current shoreline in blue)

1776

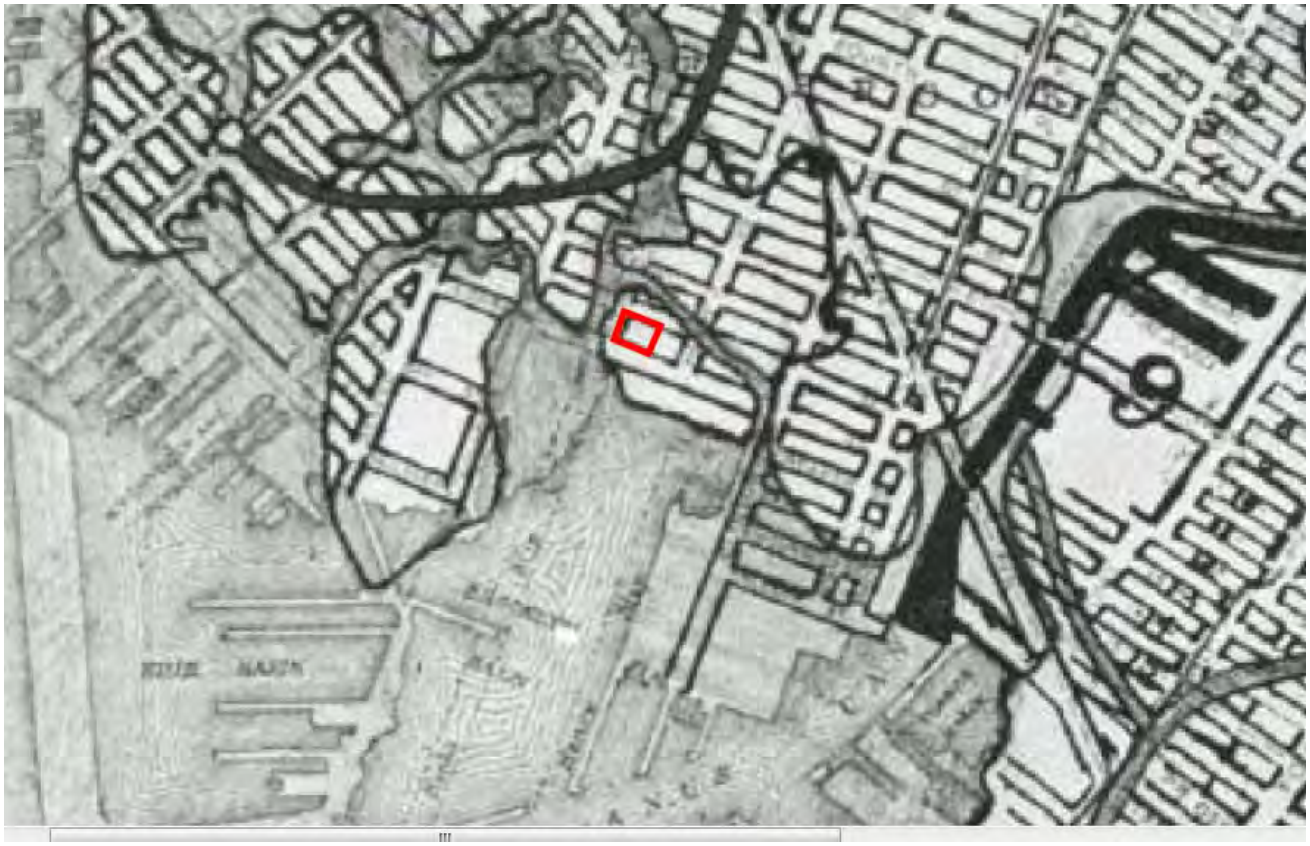
1855


MAP
OF THE CITY
OF
BROOKLYN
(as consolidated
January 1st 1855
Incorporated as a Village 1816
as a City 1834
Popl.n ab.t 200000
BAY
ERIE BASIN
BROOKLYN

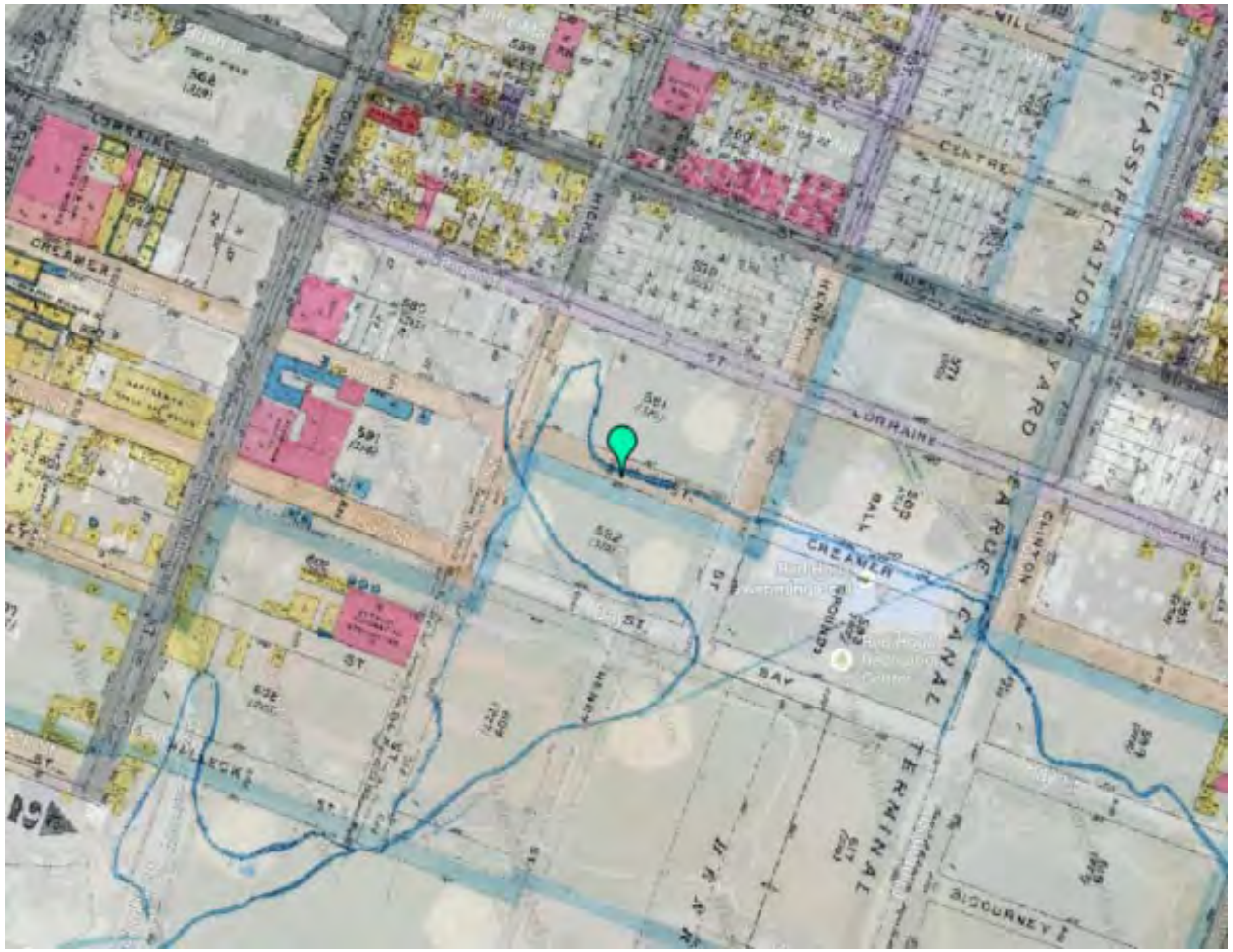
1866


GRINNELL
STREET
BAY
STREET
STREET
Certification #
D6B84D7A-A474
Site Name: Columbia Smelting & Refining Works
Address: 58 Lorraine St.
City, ST, ZIP: Brooklyn NY 11231
Client: Mission Solutions, Inc.
Copyright: 1886

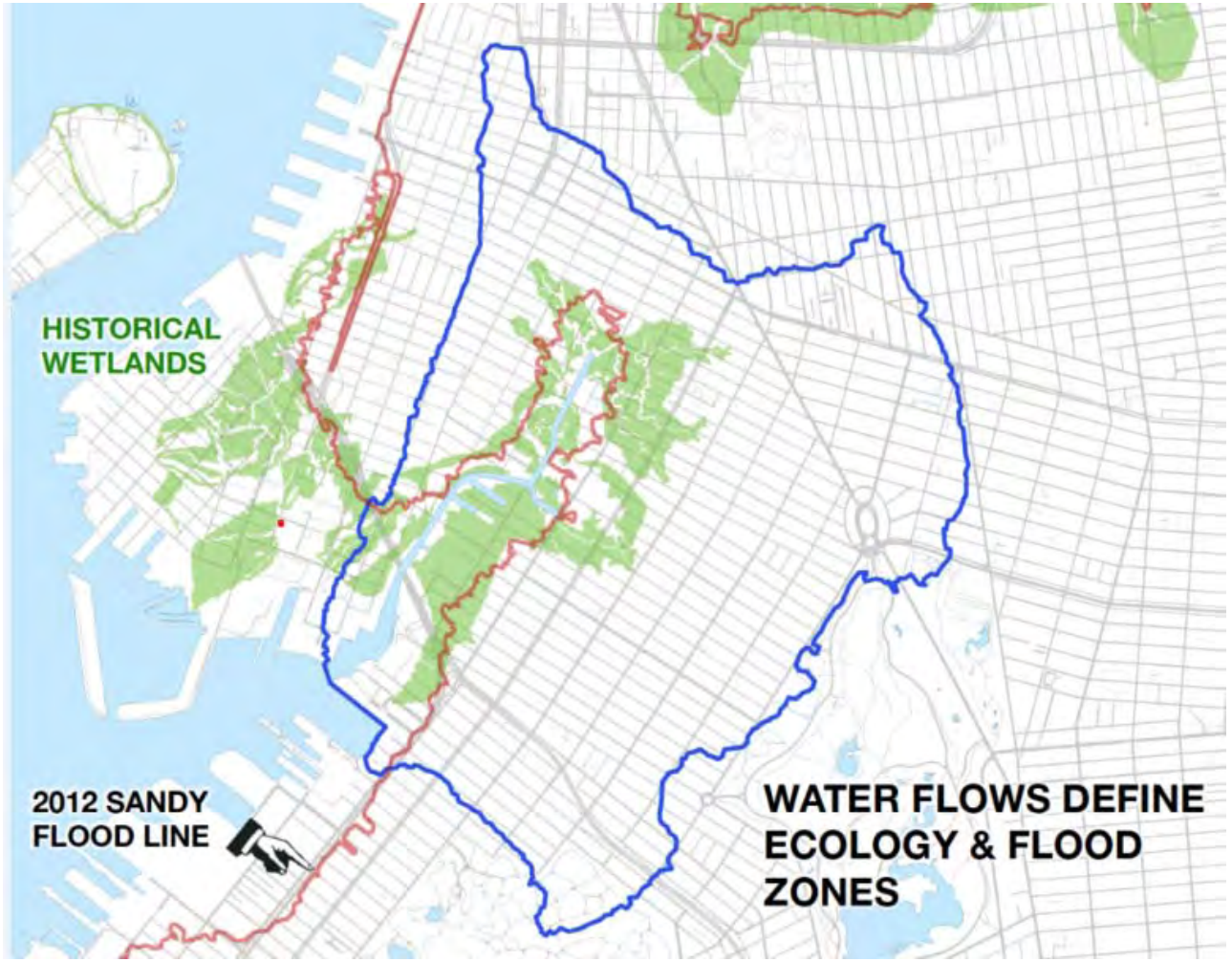
Ca. 1900



1916


CREAMER
LORRAINE
CREAMER
CANAL
TERMINAL
CENTRE
CLASSIFICATION
YARD
BAY
ST

1866 vs. 1916 map w/ historic shoreline

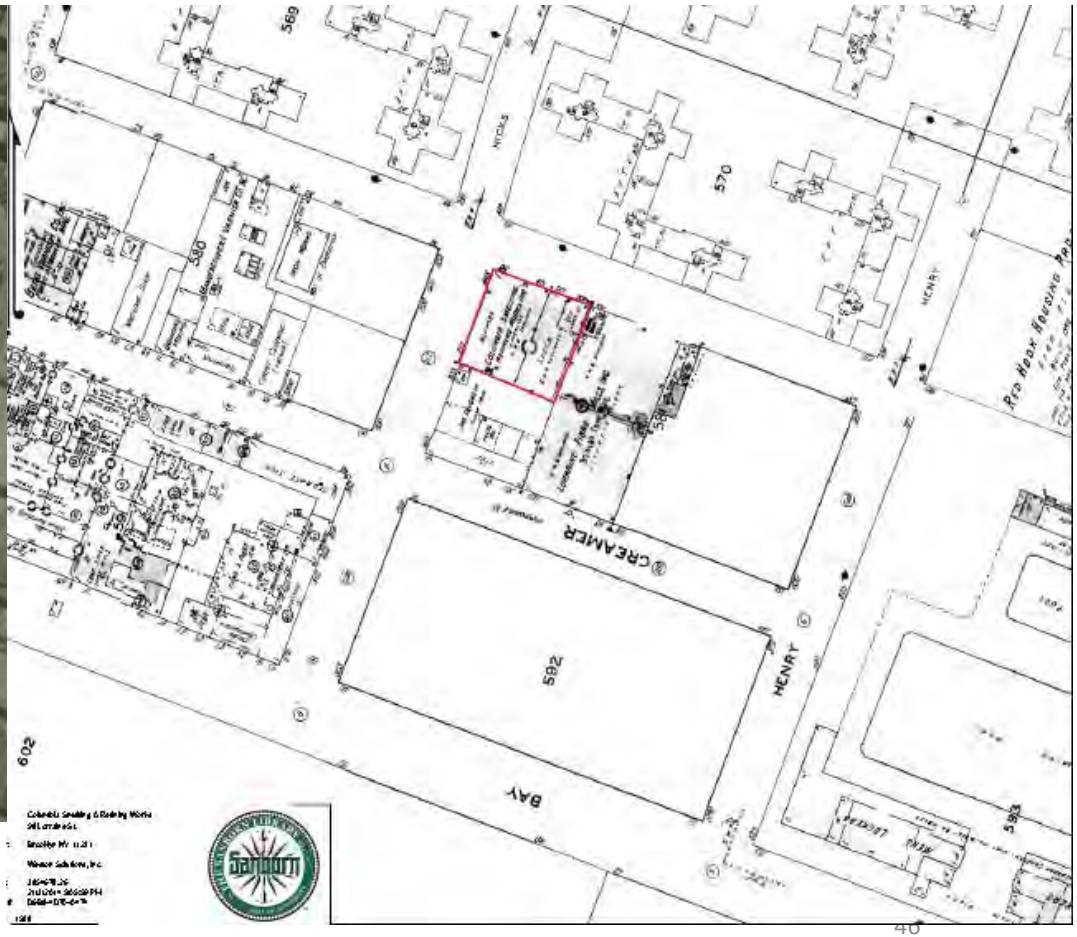

HISTORICAL
WETLANDS
2012 SANDY
FLOOD LINE
WATER FLOWS DEFINE
ECOLOGY & FLOOD
ZONES

APPENDIX B

Other Historic References – Hooverville Era

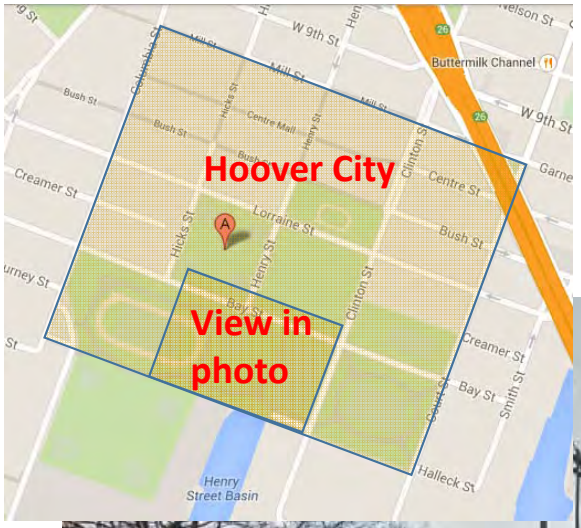
1924

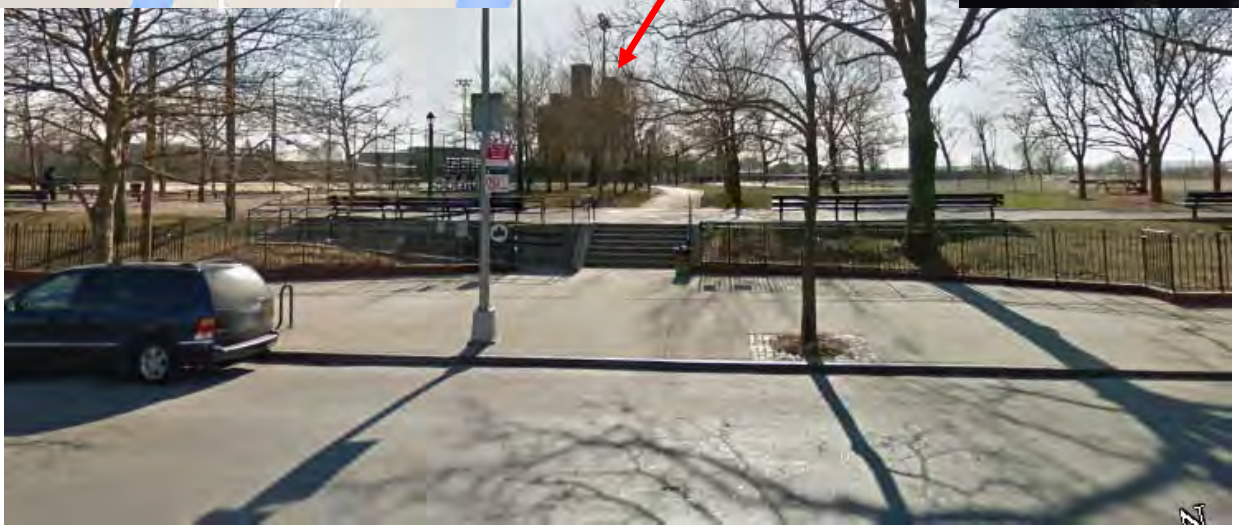
1938



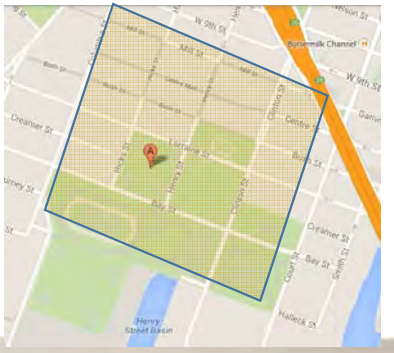
1924

1930-1932 Hoover City/Hooverville on-site

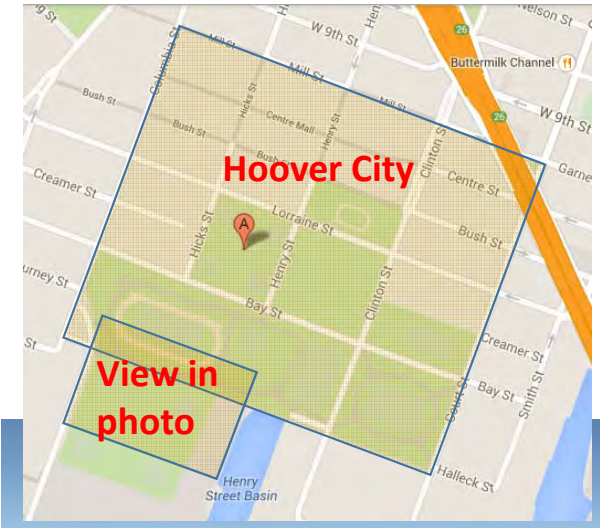


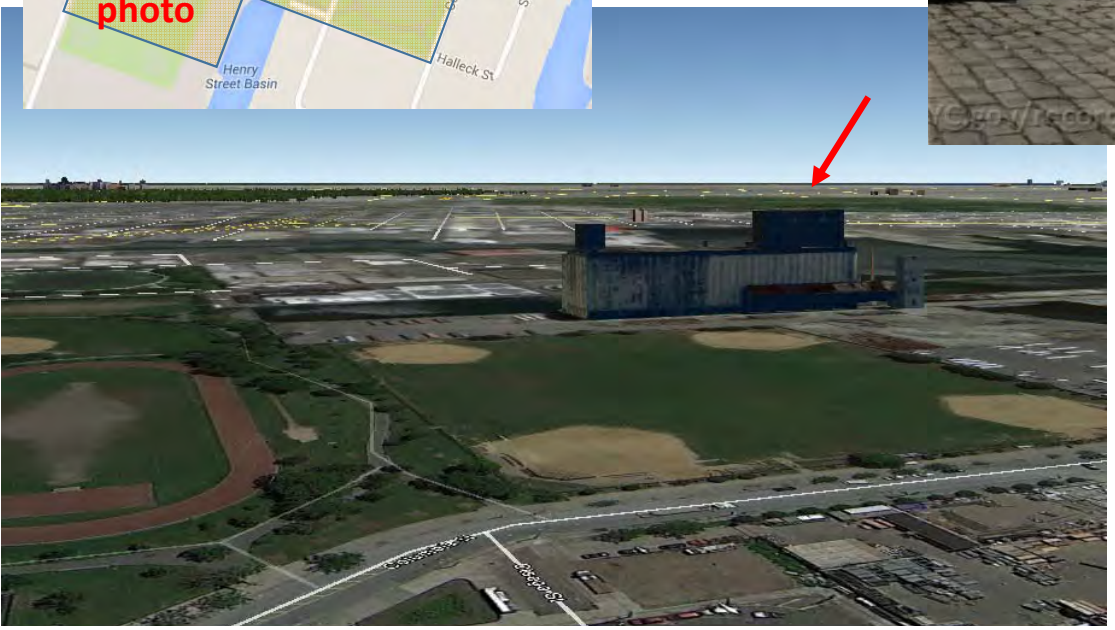


Extension/Panorama of same area

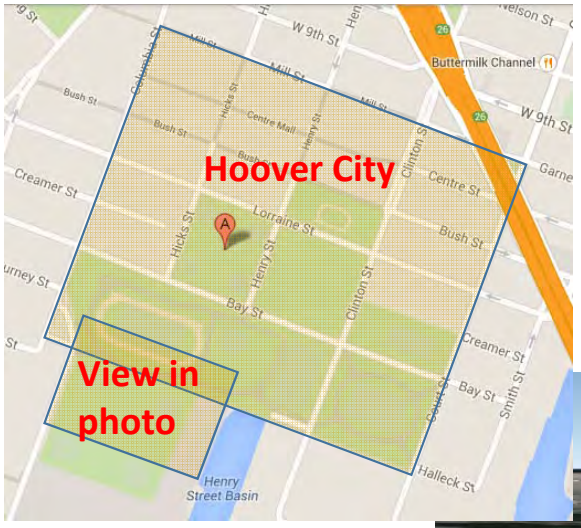


Same area, another view

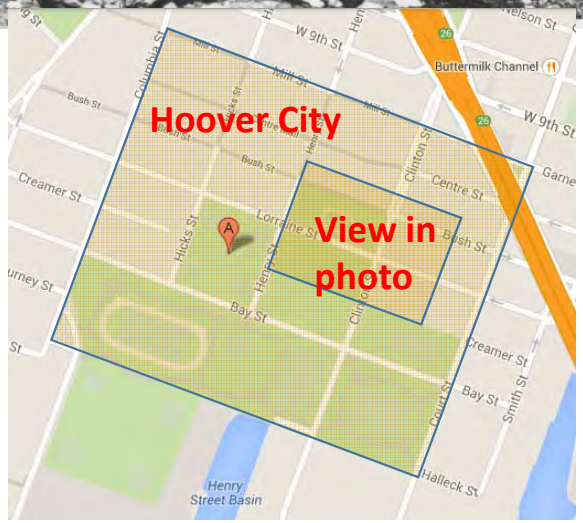




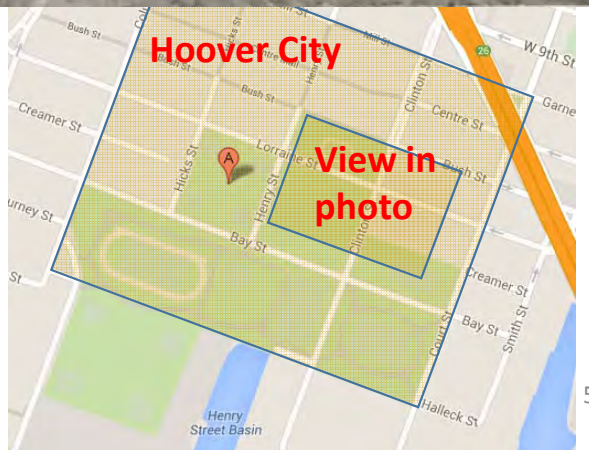
Same area, another view



Unknown Date, Hooverville on block to north of the pool

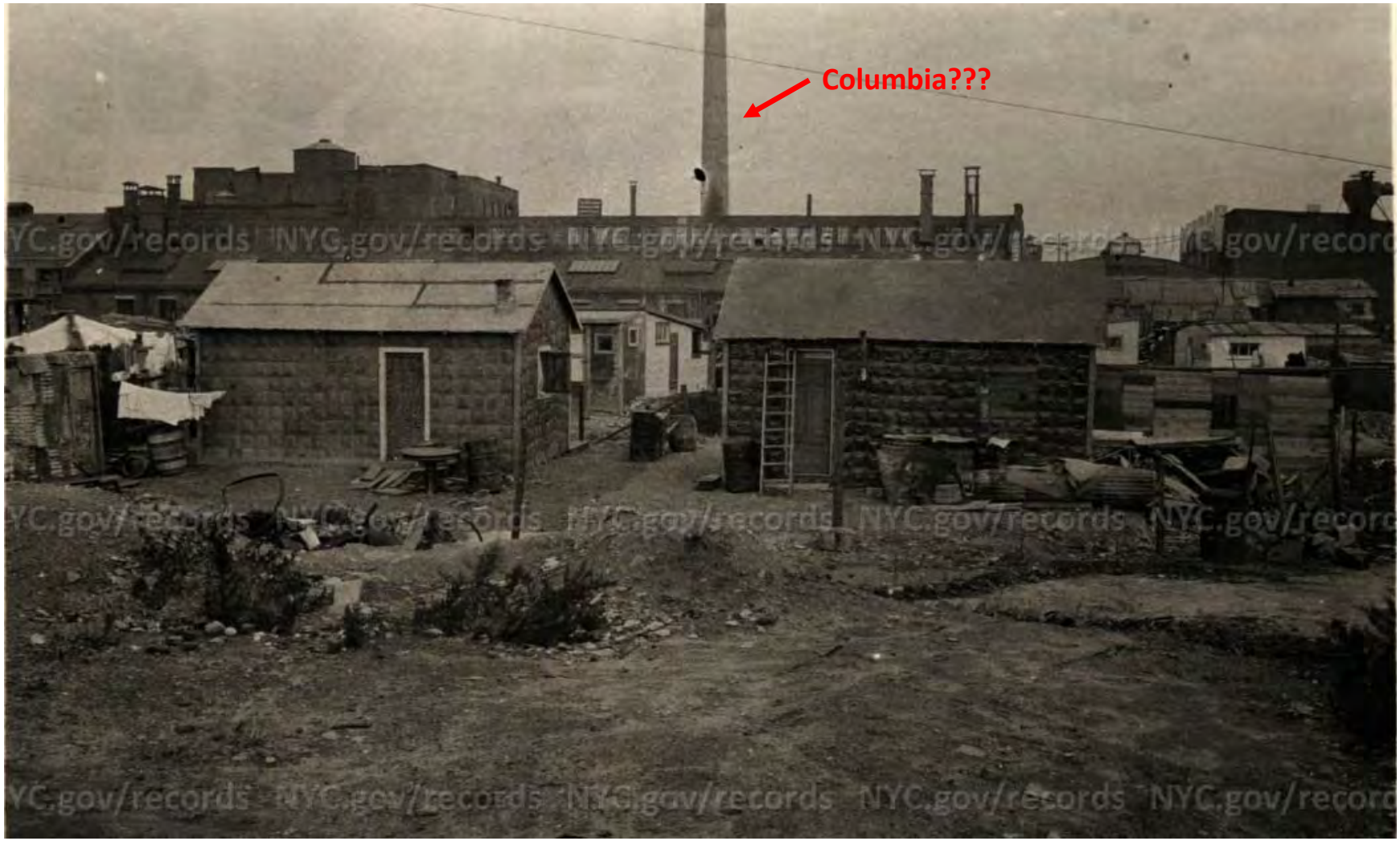


Same area, another view



Red Hook Park, unknown location

Red Hook Park, unknown location



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